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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/594,389

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Shingo Okamoto

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EXAMINER

MOWLA, GOLAM

ART UNIT

PAPER NUMBER

1723

MAIL DATE

DELIVERY MODE

08/17/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/594,389

Applicant(s)

OKAMOTO ET AL.

Examiner

GOLAM MOWLA

Art Unit

1723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 6-8, 11, 12 and 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 9, 10, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 04/26/2011
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/20/2011 has been entered.

Election/Restrictions

2. Claim 15 is directed to non-elected Species B (embodiment 3, pages 25-29). Since Applicant has elected Species A (directed to embodiments 1 and 2) without traverse in the reply filed on 06/04/2010, claim 15 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species B, there being no allowable generic or linking claim.

Response to Amendment

3. Applicant's argument of 04/20/2011 overcomes the rejection from the Office Action dated 12/21/2010. However, the arguments do not place the Application in condition for allowance.

Art Unit: 1723

4. Claims 1-15 are currently pending. Applicant has added new claims 14 and 15. Claims 6-8, 11-12 and 15 are withdrawn from consideration as being part of non-elected invention.

Status of the Objections or Rejections

5. The objection to the drawing is withdrawn in view of Applicant's persuasive argument showing that the figure 9 is not prior art.
6. Due to Applicant's persuasive argument showing that the figure 9 of the instant application is not prior art, all rejections from the Office Action dated 12/21/2010 are withdrawn. However, upon further consideration, a new ground of rejection is presented below.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 4-5 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the limitation "the heating temperature" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 5 recites the limitation "the heating temperature" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 5 recites the limitation "the heating time" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claim 14 recites the limitation "the surfaces" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claims 1-5, 9-10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US 2002/0148499 A1).

Regarding claim 1, Tanaka discloses a method of manufacturing a solar battery (solar cell string) (figs. 4 and 5) ([023], [0044] and [0068-0073]) by electrically connecting a plurality of cells (solar cell 10) to one another using connection members (interconnector 22), comprising:

- a flux applying step of applying a flux to surfaces of the cells (10) ([0071]);
- a disposing step of disposing the connection members (22) over the adjacent cells (10) to which the flux has been applied ([0072]) (fig. 5);
- a string step of connecting the connection members (22) to the cells (10) by soldering ([0073]); and
- a cell heating step of heating the cells (10) ([0071]).

Although the reference shows that the cell heating step is performed before the string strip, it is noted that selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results (*In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)) (MPEP §2144.04 IV(C)).

Art Unit: 1723

Regarding claims 2 and 3, Tanaka further discloses that a heating temperature of the cell heating step is not less than a boiling or activating temperature of the flux (the cell is heated and dried at 100°C, and therefore, the cell is heated at least at that boiling or activating temperature to dry out the flux) ([0071]).

Regarding claim 4, Tanaka further discloses that a heating temperature is 100°C and a heating time is one minute ([0071]). Although the reference is silent as to whether the heating temperature is 150°C - 160°C, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum temperature of cell heating step through routine experimentation such that the flux applied to the surface of the cells (10) is dried, as desired by Tanaka ([0071]). In addition, in the case where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.05 IIA, *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Regarding claim 5, Tanaka further discloses that a heating temperature is 100°C and a heating time is one minute ([0071]). Although the reference is silent as to whether the heating temperature is 150°C and the heating time is three minutes, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum temperature and time of cell heating step through routine experimentation such that the flux applied to the surface of the cells (10) is dried, as desired by Tanaka ([0071]). In addition, in the case where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.05 IIA, *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Art Unit: 1723

Regarding claim 9, Tanaka further discloses that the whole cells (10) are heated in the cell heating step ([0071]).

Regarding claim 10, Tanaka further discloses that the cell heating step includes: heat release means for preventing a solder which connects the connection members (22) to the cells (10) from being molten (cell heating step is performed prior to string step and thus the solder which connects the connection members 22 to the cells 10 is prevented from being molten).

Regarding claim 14, Tanaka further discloses that in the cell heating step, the cells (10) are heated (the cells are first heated by blowing hot air) ([0071]) such that residue of flux is removed from the surface of the cells (10).

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US 2002/0148499 A1) as applied to claim 1 above, and further in view Tanaka et al. (JP 2003-168811, refer to translation as provided by the applicant).

Applicant is directed above for complete discussion of Tanaka (US 2002/0148499 A1) with respect to claim 1, which is incorporated herein. Tanaka (US 2002/0148499 A1) further teaches that hot air is blown against the connection members (22) to perform the soldering ([0073]). However, Tanaka (US 2002/0148499 A1) is silent as to whether the cells are heated during the cell heating step by irradiation with an infrared ray.

Tanaka et al. (JP 2003-168811) discloses a solar battery (figs. 2-3) by electrically connecting a plurality of cells (photovoltaic cell 1) to one another using connection members (tab lead 4). Tanaka further teaches that the cells (1) the use of infrared heater (9) which irradiates

Art Unit: 1723

infrared rays in order to efficiently solder the connection member (4) to the photovoltaic cell (1) (abstract and [0008-0009]).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to use the IR heater of Tanaka et al. (JP 2003-168811) in the method of Tanaka (US 2002/0148499 A1) in order to efficiently solder the connection member to the photovoltaic cell, as taught by Tanaka et al. (JP 2003-168811).

12. Claims 1-5, 9-10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. (US 5,466,302) in view of Kawamata et al. (JP 05-245622, see English translation as provided by the Applicant on 04/28/2011).

Regarding claim 1, Carey discloses a method of manufacturing a solar battery (solar cell string) (figs. 1-4, most particularly fig. 2) (2:33-5:5) by electrically connecting a plurality of cells (solar cell 10 and solar cell 11) to one another using connection member (metallic interconnect 14'), comprising:

- a flux applying step of applying a flux to surfaces (12' and 13') of the cells (11 and 12) (Pb-Sn solder cream 15' and 16' which comprises 15% by weight flux) (see example II);
- a disposing step of disposing the connection member (14') over the adjacent cells (11 and 12) to which the flux has been applied (fig. 2); and
- a string step of connecting the connection member (14') to the cells (10 and 11) by soldering (see example II).

Art Unit: 1723

Carey discloses the use of a single connection member (14'). Although Carey is silent as to the use of a plurality of connection members to electrically interconnect solar cells 10 and 11, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art (*St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8).

However, Tanaka is also silent as to a cell heating step of heating the solar cells (10 and 11).

Kawamata is directed to a formation of reliable soldered parts (see abstract). Kawamata discloses that Pb-Sn based cream solder comprising flux is reheated at 100-150°C after soldering in order to remove the flux to form reliable soldered parts ([0013-0022]).

Although the references are not in the same filed of endeavor, namely method of forming solar battery, both the references are directed to forming soldered part using Pb-Sn based cream solder. Thus, one skilled in the art would have reasonable expectation of success by incorporating the teaching of Kawamata in the method of Carey such that the cells are reheated after soldering such that the flux residues are removed to allow for reliable soldering between the surfaces (12' and 13') of the cells (11 and 12) and interconnection member (14'). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated a cell heating step in the method of Carey after the cells are connected to the connection members such that the flux residues are removed in order to provide reliable soldered part, as taught by Kawamata.

Regarding claims 2 and 3, Carey in view of Kawamata further discloses that a heating temperature of the cell heating step is not less than a boiling or activating temperature of the flux

Art Unit: 1723

(Carey in view of Kawamata discloses that the flux are removed and therefore the heating temperature has to be greater or equal to boiling or activating temperature to dry out the flux).

Regarding claims 4 and 5, Carey in view of Kawamata further discloses that a heating temperature is 150°C and a heating time is two minute (see [0019] of Kawamata). Although the reference is silent as to whether the heating time is three minutes, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum temperature and time of cell heating step through routine experimentation such that the flux applied to the surface of the cells (10 and 11) is removed, as desired by Carey in view Kawamata. In addition, in the case where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.05 IIA, *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Regarding claim 9, Carey in view of Kawamata further discloses that the whole cells (10 and 11) are heated in the cell heating step ([0019] of Kawamata).

Regarding claim 10, Carey in view of Kawamata further discloses that the cell heating step includes: heat release means (heating furnace) ([0019] of Kawamata) for preventing a solder which connects the connection members (214') to the cells (10 and 11) from being molten (cell heating step is performed at 100°C, which is lower than the temperature required to melt Pb-Sn based cream solder).

Regarding claim 14, Carey in view of Kawamata further discloses that in the cell heating step, the cells (10 and 11) are heated such that residue of flux is removed from the surface of the cells (10 and 11) (Carey in example II discloses cleansing step, and Kawamata discloses heating step [0013-0022]).

Art Unit: 1723

13. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. (US 5,466,302) in view of Kawamata et al. (JP 05-245622) as applied to claim 1 above, and further in view of Gonsiorawski et al. (US 5,074,920) and Tanaka et al. (JP 2003-168811, refer to translation provided by the applicant).

Applicant is directed above for complete discussion of AAPA with respect to claim 1, which is incorporated herein. However, the reference is silent as to whether in the string step, hot air is blown against the connection members to perform the soldering, and in the cell heating step, the cells are irradiated with an infrared ray to heat.

It is well known in the solar or photovoltaic art to blow hot air against the tabbing/connection member to perform soldering effectively, as taught by Gonsiorawski (see example 1).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to blow hot air against the tabbing/connection member to perform soldering as taught by Gonsiorawski in the method of Carey in view of Kawamata such that the connection member is soldered effectively to the surface of the solar cell.

Tanaka discloses a solar battery (figs. 2-3) by electrically connecting a plurality of cells (photovoltaic cell 1) to one another using connection members (tab lead 4). Tanaka further teaches that the cells (1) the use of infrared heater (9) which irradiates infrared rays in order to efficiently solder the connection member (4) to the photovoltaic cell (1) (abstract and [0008-0009]).

Art Unit: 1723

Therefore, it would have been obvious to one skilled in the art at the time of the invention to use the IR heater of Tanaka in the method of Carey in view of Kawamata in order to efficiently solder the connection member to the photovoltaic cell, as taught by Tanaka.

Response to Arguments

14. Applicant's arguments with respect to claims 1-5, 9-10 and 13-14 have been considered but are moot in view of the new ground(s) of rejection as necessitated by the amendments.

On pages 6-8 of Remarks, Applicant argues that figure 9 is not prior art and therefore can not be applied to pending claims 1-5, 9-10 and 13-14.

This argument is persuasive and is moot in view of withdrawal of the rejection.

Correspondence/Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-Th, 0800-1830 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

Art Unit: 1723

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./

Examiner, Art Unit 1723

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1723